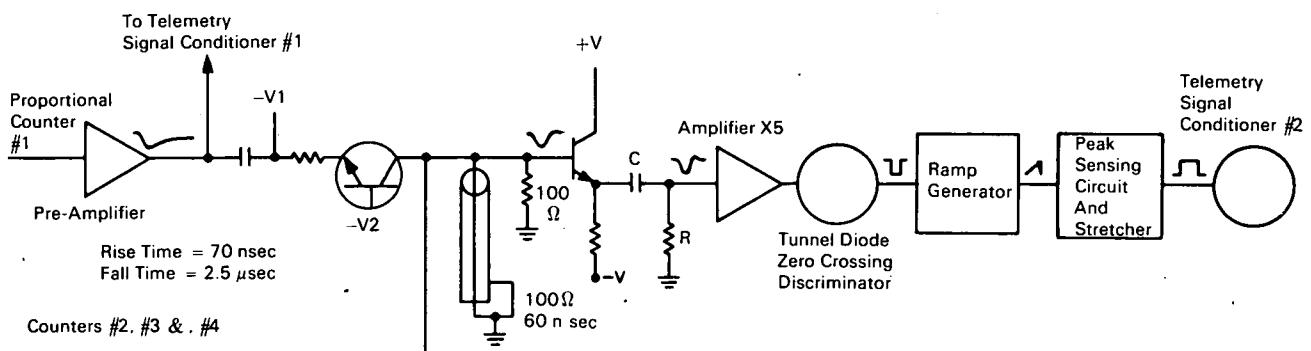


NASA TECH BRIEF



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Division, NASA, Code UT, Washington, D.C. 20546.

Reduction of Background in an X-Ray Proportional Counter



Block Diagram of the Rise Time Discrimination System

The problem:

To design a proportional counter with increased sensitivity for high resolution X-ray surveys and locating weak cosmic X-ray sources, while reducing non-X-ray background.

The solution:

Rise time discrimination, using a charge sensitive preamplifier with high gain and large bandwidth combined with a zero crossing discriminator.

How it's done:

It is thought that the basis for the discrimination originates in the difference in path length between a photoelectron and an energetic particle depositing the same amount of energy in the counter. This results in a difference in rise time between the corresponding output signals.

The system as shown in the figure consists of a pre-amplifier with a charge sensitive input section of 4

transistors and a pair of transistors which perform as a high gain video amplifier. The finite bandwidth of the preamps limits the rise time of the X-ray signals to a minimum of 7 nsec and differentiates the output by a time constant of 2.5 μ sec. Two output signals emerge from the pre-amp. One is used for pulse height analysis and the other is routed to a mixer which receives inputs from 4 independent detectors before reaching the rise time discriminator.

The output of the mixer is clipped by a 100 ohm, 60 nsec shorted lumped constant delay line. After amplification, the signal is applied to the zero crossing detector. The output is a fast rising and falling waveform of a nearly constant width for all X-ray energies above 2 keV. This width is converted to an amplitude using the ramp generator. Subsequently the signal is amplified, delayed 3 μ sec and stretched to a width of 1000 μ sec before passing to the telemetry transmitter.

(continued overleaf)

Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference: NASA-CR-96716 (N68-34803)
A Continuation of a Program of High
Angular Resolution Studies of Celestial
X-Ray sources.

Patent status:

No patent action is contemplated by NASA.

Source: P. Gorenstein and Stanley P. Mickiewicz
American Science and Engineering, Inc.
under contract to
NASA Headquarters
(HQN-10253)